

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ANC24FA029

ENGINE INVESTIGATION

June 14, 2024

A. ACCIDENT

Location: Fairbanks, Alaska
Date: April 23, 2024
Time: 10:03 Local
Airplane: Douglas C54D

B. ENGINE INVESTIGATION

Investigator	Mark Ward National Transportation Safety Board Anchorage, Alaska
Group Member	John Ellis National Transportation Safety Board Washington, DC
Group Member	Joshua Cawthra National Transportation Safety Board Federal Way, Washington
Group Member	Alan Cruce Air Fuel Aurora, Colorado

C. SUMMARY

The recovered engine and portions of the recovered airframe were examined at the facilities of Alaska Claims Services, Wasilla, Alaska, on June 13 and 14, 2024.

D. DETAILS OF THE EXAMINATION

1.0 Engine Examination

The recovered engine was laid out on the shop floor. The accessory / blower section had separated from the engine case. The propeller remained attached to the gear reduction assembly, which was separated from the engine case. The engine mount remained attached, with some impact damage and thermal damage. The carburetor was separated from the accessory case. The fuel pump was separated from the engine and not recovered. The propeller governor and both magnetos were also separated from the engine and not recovered.

The engine case itself which consisted of two rows of cylinders were mostly intact and had varying degrees of impact damage. Several push rod tubes with pushrods separated and not located. Two cylinders were removed, one from each row, and the engine internal area was inspected with a lighted borescope. The engine crankshaft, master rods, articulating rods, and pistons were intact and exhibited normal operating signatures. The bottom of the piston skirts had weight markings (from a marker), consistent with when the engine would have been overhauled. The rear cam ring is exposed due to the accessory case being broken from the engine case. The cam ring and cam followers all in good condition showing no wear. The crankcase section of the engine had no evidence of any pre-impact damage.

The propeller reduction gearcase, the nose of the engine case had separated exposing the internal planetary gears. The gears appear in excellent condition still bearing the markings (in marker) for timing. The nose case or gears show no evidence of any pre-impact damage.

The accessory case and blower section exhibited varying degrees of impact damage. This section of the engine exhibited varying degrees of fire and thermal damage. Multiple heater pads were damaged or consumed by fire. The area to the upper right of the carburetor mount, exhibited extensive thermal damage. Numerous hoses and wiring were consumed by fire.

The carburetor, which was separated from its mount, was covered with soot. The intake screen exhibited thermal damage. All of the fuel hoses were mostly burned away, however, the hose B nuts remained attached to their respective fittings. The throttle and mixture control arms remained attached to the carburetor; however, the linkages were separated.

A blower vent fitting on the bottom of the engine was separated from the engine, however, the safety wire remained attached and secure to the engine. The threads of the vent fitting were undamaged and appeared to be corroded.

One AN-8 hose fitting was found in the exhaust heat shield area. The hose had burned from the fitting and the threads were in good condition with no apparent mechanical damage.



Figure 1 AN-8 hose fitting found in the exhaust heat shield with undamaged threads.

A portion of the firewall, which was separated from the engine, engine mount, and remaining portion of the airframe, had a 90-degree elbow -8 sized AN bulkhead fitting installed. One end of the fitting had a B nut and metal hard line installed. The opposing end did not have a B nut or hose attached. The threads of the fittings were intact and undamaged. This fitting was part of the propeller feathering system.



Figure 2 Firewall connection of the propeller feathering system.



Figure 3. View of the AN-8 nut connected to the firewall fitting. Matching up the two parts found in the wreckage.



Figure 4. View of the undamaged fitting connected to the firewall.

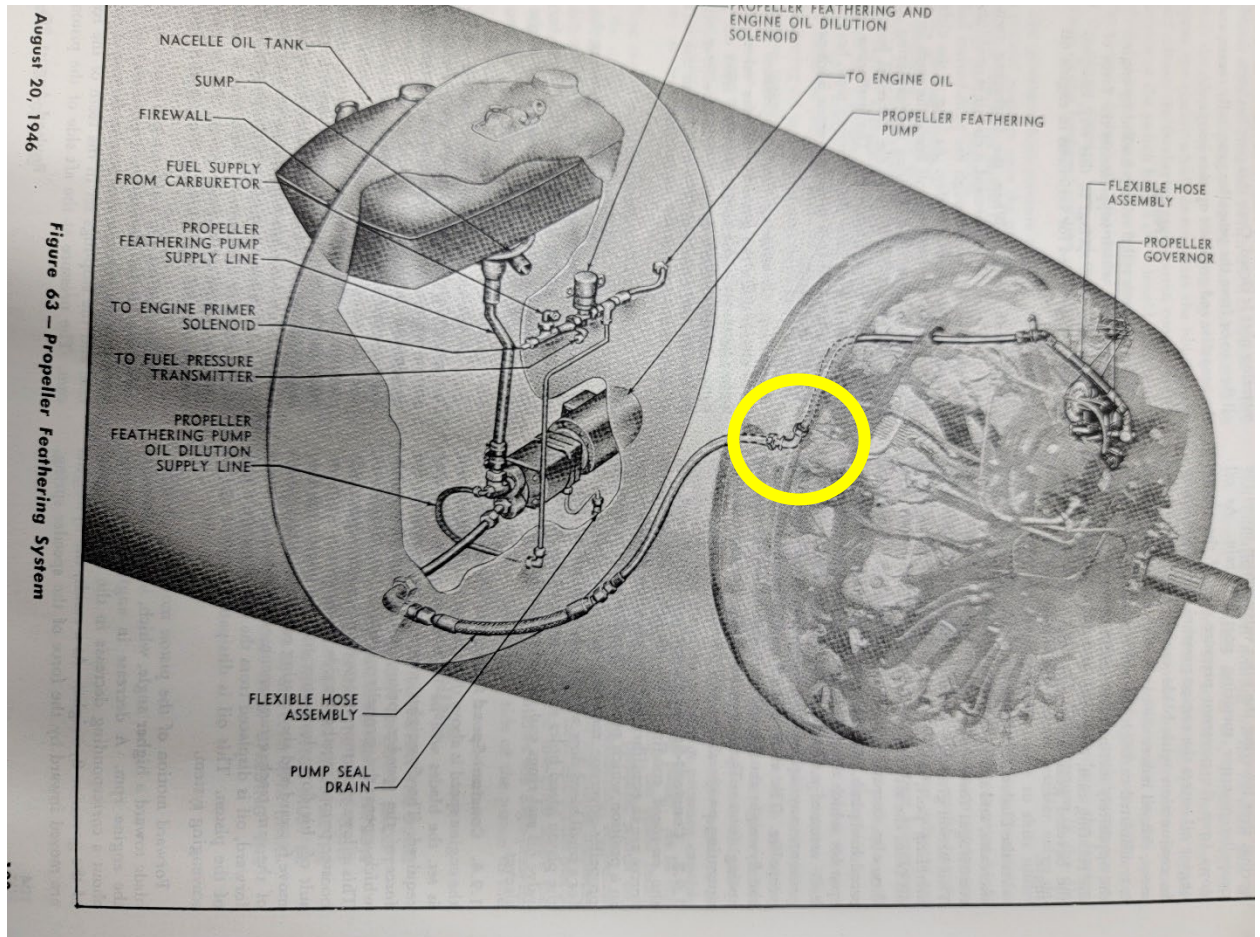


Figure 5 Location of the firewall section found. Part of the propeller feathering system.

The exhaust system was impact damaged. Residual oil residue was observed throughout the entire external area of the exhaust system.

2.0 Propeller Examination

The propeller remains attached to the propeller flange and gearcase. One blade was separated at the hub and not recovered. The two remaining propeller blades remained attached to the propeller hub and were relatively undamaged. Propeller blades were between un-feathered and feathered.



Figure 6 View of the number 1 engine propeller.



Figure 7 Side view of the number 1 engine propeller.

3.0 Airframe Examination

Using video surveillance, a likely area where the explosion occurred was identified and was sent to the Alaska State Troopers (AST). AST searched the area from a helicopter and located debris from the accident airplane. On May 15, 2024, three NTSB investigators hiked into the location. Two large sections of the upper left wing, the aileron bell housing and numerous small aluminum fragments were found in a generally straight line within about 150 yards. The upper/outside skin of the metal found revealed evidence of melted metal spewed across them. A portion of

leading-edge wing structure was part of the recovered wreckage. The structure exhibited a light residue of oil on the external side.



Figure 8 View of the top side of the upper left wing.



Figure 9 View of the underside of the large section of the upper left wing.



Figure 10 View of the left wing aileron control bell housing.



Figure 11 View of the left wing aileron control bell housing.



Figure 12 Section of the upper portion of the left wing.



Figure 13 View of the underside of the upper section of the left wing.



Figure 14 View of the melted metal spewed across the upper surface.

Submitted by:

John D. Ellis
Aviation Accident Investigator
Piston Engine